Chapter 17: Environmental Justice & Protection of Children

Introduction

Executive Order 12898 requires that, to the greatest extent practicable and permitted by law, each federal agency must make achieving environmental justice part of its mission. EPA examined whether the proposed regulation will promote environmental justice in areas affected by MP&M discharges.

The proposed rule is not subject to Executive Order 13045, "Protection of Children from Environmental Health Risks and Safety Risks" (62 FR 19885, April 23, 1997), because it is based on technology performance and not on health or safety risks. The regulation is still expected to reduce lead and other pollutants that affect children's health. EPA has therefore analyzed the reduction of children's health impacts associated with the MP&M regulation.

EPA concludes that the proposed rule reduces risks to disadvantaged populations (e.g., subsistence anglers), and that MP&M discharges have a disproportionally high environmental impact on minority populations, based on the demographic characteristics of the populations residing in the counties affected by MP&M discharges.

The following three sections present EPA's environmental justice analysis. Section 17.1.1 discusses the proposed rule's impacts on subsistence anglers. Section 17.1.2 assesses whether MP&M discharges have a disproportionally high impact on minority populations. Section 17.2 addresses the proposed regulation's effects on children from subsistence and recreational fishing families.

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17.1 Environmental Justice

17.1.1 Changes in Health Risk for Subsistence Anglers

Subsistence anglers include low-income and minority populations that rely heavily on fishing for their food supply. Subsistence anglers are at a disproportionally higher risk from MP&M pollutants than other people who eat fish because their diets rely heavily on fish caught in local waters.

EPA estimated changes in cancer and systemic health risk to subsistence anglers and recreational fishermen in Chapter 13, *Human Health Benefits*. EPA's estimates show that subsistence anglers have a significantly higher average lifetime cancer risk from fish consumption than do recreational anglers at the baseline discharge levels. Subsistence fishing families also have a greater risk of systemic health effects in the baseline. EPA's analysis of changes in adverse health effects from the proposed rule show that subsistence anglers receive a large share of benefits, due to their disproportionately higher baseline risk.

a. Cancer risk

EPA estimates that approximately 3,772,703 subsistence anglers fish 58,530 MP&M reaches nationwide. Individuals in subsistence fishing households are exposed to 13 cancer causing agents that are discharged by 62,752 MP&M facilities to our nation's waters. The estimated average lifetime cancer risk in the baseline for subsistence and recreational anglers is 20.3 in one million and 8.08 in one million, respectively. The estimated reduction in average lifetime cancer risk for subsistence anglers is more than double the reduction in risk for sport anglers (i.e., 7.70 in one million vs. 3.77 in one million) (see Table 17.1).

Table 17.1: Estimated National Changes in Average Lifetime Cancer Risk to Subsistence vs. Recreational Anglers (62,752 MP&M Facilities)

	Average Lifetime Cancer Risk per Individual		Estimated Changes in Individual Lifetime Cancer Risk
Exposed Population Category	Baseline	Preferred Option	Preferred Option
Subsistence Anglers	0.00002030	0.00001260	0.00000770
Recreational Anglers	0.00000808	0.00000431	0.00000373

Source: U.S. EPA analysis.

b. Systemic health risk

The Agency conducted a similar analysis to assess reductions in systemic health risks from fish consumption. This study used the ***hazard ratio*** analysis performed and discussed in Chapter 13. A hazard ratio greater than one (HR > 1) indicates that individuals are expected to ingest MP&M pollutants at rates sufficient to pose a significant risk of suffering systemic health effects.

Table 17.2 presents systemic health risk analysis results for the fish consumption pathway. These results show that pollutant discharges from MP&M facilities are likely to have a disproportional impact on subsistence anglers. Approximately 320,000 subsistence anglers fish 627 reaches to which *885 sample* MP&M facilities directly or indirectly discharge. Anglers fishing 18 of these reaches ingest MP&M pollutants at rates sufficient to pose a significant risk of health effects at the baseline discharge levels. Approximately 7,000 subsistence anglers face a hazard ratio greater than one. This figure represents 2.2 percent of all subsistence anglers on MP&M sample facility reaches. A much smaller proportion of recreational anglers (0.15 percent) face a hazard ratio of greater than one under baseline conditions.

The number of subsistence anglers at systemic health risk from the sample MP&M facility discharges is reduced by 4,616 (66 percent) (see Table 17.2). The actual number of subsistence anglers expected to benefit from reduced systemic health risk from the MP&M regulation is much greater, because this analysis includes only 885 MP&M facilities, not the full 62,752 whose discharges will be affected by the proposed regulation.[1] The proportion of recreational anglers expected to suffer systemic health effects after the MP&M rule is implemented declines from 0.15 to 0.05 percent. While the proposed rule does not eliminate the differential risks to subsistence anglers, it does provide the majority of benefits to the disadvantaged populations at greatest risk in the baseline.

[1] EPA did not evaluate non-cancer benefits at the national level due to analytic tractability issues. These issues come about because the exact location of facilities represented by sample weights is unknown.

Table 17.2: Estimated Changes in Systemic Health Risk to Subsistence and Recreational Anglers

Regulatory Status	Total Exposed Anglers	Anglers Exposed to HR>1		Anglers Benefiting from the MP&M Rule	
		Number of Individuals	Percent of Total Exposed Individuals	Number of Individuals	Percent of Baseline
Subsistence Anglers					
Baseline[a]	320,366	6,971	2.2%		
Preferred Option	320,366	2,355	0.7%	4,616	66%
Recreational Anglers					
Baseline[a]	6,407,076	9,765	0.15%		
Preferred Option	6,407,076	2,897	0.05%	6,868	70%

a. This analysis is based on 885 facilities.
Source: U.S. EPA analysis.

17.1.2 Demographic Characteristics of Populations Living in the Counties Near MP&M Facilities

EPA assessed whether adverse environmental, human health, or economic effects associated with MP&M facility discharges are more likely to affect minorities and low-income populations. This analysis uses the 1990 Census data on the race, national origin, and income level of populations residing in counties traversed by reaches receiving discharges from 885 sample MP&M facilities. The 885 sample facilities are located in 643 counties in 46 states (excluding Alaska, Hawaii, Nevada, and Wyoming). This survey was designed to provide a representative coverage of various types of MP&M facilities, but not of their geographical location. EPA is therefore able to analyze only the location characteristics of the sample facilities, and not all 62,752 MP&M dischargers.

EPA compared demographic data on the counties traversed by sample ***MP&M reaches*** with the corresponding state level indicators. Table 17.3 presents the results of this analysis:

- Counties affected by MP&M effluents tend to have a larger proportion of African-Americans in their populations than the state average in 41 of the 46 states included in the analysis. The proportion of African-Americans in the counties affected by MP&M discharges ranges from about 0.6 percent in Montana to 41.4 percent in Louisiana (see Table 17.3). The state averages of the proportion of African-Americans are lower, ranging from 0.3 percent in Montana to 35.6 in Mississippi. In five states (District of Columbia, North Carolina, South Carolina, Vermont, and West Virginia), the proportion of African-Americans in MP&M counties corresponds to the state averages. Of these, however, only two states (NC and SC) are associated with more than one sample MP&M facility. The proportion of Native Americans in the population of counties affected by MP&M effluents is less than or equal to the state average in 42 of the 46 states. In 38 of the 46 states, counties affected by MP&M effluents have a larger proportion of Asians and Pacific Islanders in their populations than the state average. Both these population groups, however, comprise only a very small part of the total population of most states.

- Other socioeconomic characteristics of the populations residing in the counties abutting reaches affected by MP&M discharges generally reflect state averages. These characteristics include percent of population below poverty level, percent unemployed, and percent children.

- Counties abutting reaches affected by MP&M effluents tend to have slightly higher median

incomes than the state-level median income. EPA calculated median income for the group of counties receiving MP&M discharges as an average of each county's median household income.[2] EPA calculated this summary variable in place of the true median household income for which appropriate census data are not available. Comparing this weighted average median income to the state-level median income may introduce uncertainty in the analysis.

[2] Average income in MP&M counties = Σ_i Median Income (i) × Number of Households (i)/Σ Number of Households (i) where i is a sample MP&M county.

Table 17.3: County Level Comparison of Demographic Data: Counties with Sample MP&M Facilities Versus Entire State

State	Counties	% White	% African-American	% Native American, Eskimo, or Aleut	% Asian or Pacific Islander	Median Income	% Below Poverty Level	% Un-employed	% Children
Alabama									
MP&M Only	10	70.44%	28.27%	0.43%	0.73%	$26,418	16.76%	6.75%	26.21%
Entire State	67	73.63%	25.24%	0.45%	0.54%	$23,597	18.34%	6.87%	26.23%
Arizona									
MP&M Only	5	81.56%	3.27%	4.49%	1.59%	$28,918	14.68%	6.75%	26.45%
Entire State	15	80.97%	3.00%	5.58%	1.48%	$27,540	15.74%	7.17%	26.70%
Arkansas									
MP&M Only	17	82.29%	16.43%	0.58%	0.45%	$23,676	16.04%	6.04%	25.87%
Entire State	75	82.71%	15.89%	0.61%	0.51%	$21,147	19.07%	6.76%	26.43%
California									
MP&M Only	26	67.61%	7.90%	0.73%	10.34%	$36,584	12.54%	6.58%	25.90%
Entire State	58	69.07%	7.39%	0.84%	9.57%	$35,798	12.51%	6.65%	26.01%
Colorado									
MP&M Only	7	86.46%	5.39%	0.76%	2.27%	$32,040	10.45%	5.64%	25.85%
Entire State	63	88.31%	3.98%	0.87%	1.80%	$30,140	11.68%	5.74%	26.10%
Connecticut									
MP&M Only	8	87.09%	8.32%	0.21%	1.49%	$42,319	6.82%	5.36%	22.81%
Entire State	8	87.09%	8.32%	0.21%	1.49%	$41,721	6.82%	5.36%	22.81%
Delaware									
MP&M Only	1	80.50%	16.41%	0.17%	1.54%	$38,617	7.54%	3.82%	23.97%
Entire State	3	80.36%	16.83%	0.33%	1.32%	$34,875	8.71%	3.99%	24.47%
District of Columbia									
MP&M Only	1	29.61%	65.87%	0.26%	1.85%	$30,727	16.87%	7.16%	19.22%
Entire State	1	29.61%	65.87%	0.26%	1.85%	$30,727	16.87%	7.16%	19.22%
Florida									
MP&M Only	22	82.64%	13.71%	0.29%	1.26%	$28,200	12.67%	5.88%	21.90%
Entire State	67	83.13%	13.57%	0.33%	1.16%	$27,483	12.69%	5.78%	22.14%
Georgia									
MP&M Only	22	67.53%	29.89%	0.21%	1.67%	$33,979	11.87%	5.35%	25.85%
Entire State	159	71.06%	26.93%	0.24%	1.14%	$29,021	14.65%	5.74%	26.71%
Idaho									
MP&M Only	1	93.78%	0.54%	2.41%	1.28%	$26,275	13.78%	6.20%	32.52%
Entire State	44	94.44%	0.36%	1.46%	0.90%	$25,257	13.25%	6.15%	30.58%
Illinois									
MP&M Only	27	74.05%	17.58%	0.21%	2.96%	$34,825	11.50%	6.70%	25.97%
Entire State	103	78.37%	14.79%	0.21%	2.49%	$32,252	11.91%	6.64%	25.79%
Indiana									
MP&M Only	36	87.27%	10.73%	0.25%	0.80%	$28,865	11.31%	5.88%	25.93%
Entire State	93	90.59%	7.75%	0.26%	0.66%	$28,797	10.68%	5.74%	26.29%
Iowa									
MP&M Only	8	94.34%	4.19%	0.26%	0.65%	$27,057	12.58%	5.64%	26.54%
Entire State	99	96.70%	1.70%	0.28%	0.88%	$26,229	11.48%	4.53%	25.91%
Kansas									
MP&M Only	8	87.10%	8.79%	0.89%	1.52%	$32,647	9.71%	5.02%	27.41%
Entire State	105	90.16%	5.73%	0.94%	1.26%	$27,291	11.48%	4.70%	26.72%

Table 17.3: County Level Comparison of Demographic Data: Counties with Sample MP&M Facilities Versus Entire State

State	Counties	% White	% African-American	% Native American, Eskimo, or Aleut	% Asian or Pacific Islander	Median Income	% Below Poverty Level	% Un-employed	% Children
Kentucky									
MP&M Only	38	88.90%	9.98%	0.20%	0.68%	$25,500	15.53%	6.48%	25.44%
Entire State	120	92.06%	7.11%	0.19%	0.47%	$22,534	19.03%	7.37%	25.93%
Louisiana									
MP&M Only	10	56.65%	41.40%	0.22%	1.17%	$22,834	24.40%	10.25%	28.43%
Entire State	64	67.30%	30.77%	0.48%	0.94%	$21,949	23.58%	9.65%	29.13%
Maine									
MP&M Only	4	98.07%	0.58%	0.44%	0.75%	$29,686	9.98%	5.97%	24.29%
Entire State	17	98.35%	0.44%	0.52%	0.56%	$27,854	10.80%	6.65%	25.19%
Maryland									
MP&M Only	9	66.13%	28.97%	0.28%	3.50%	$40,452	8.73%	4.51%	23.96%
Entire State	24	71.03%	24.87%	0.30%	2.88%	$39,386	8.27%	4.30%	24.31%
Massachusetts									
MP&M Only	9	89.53%	5.20%	0.19%	2.41%	$37,847	8.94%	6.75%	22.56%
Entire State	14	89.95%	4.94%	0.21%	2.34%	$36,952	8.93%	6.72%	22.46%
Michigan									
MP&M Only	22	77.53%	19.72%	0.47%	1.27%	$32,064	14.05%	8.58%	26.67%
Entire State	84	83.47%	13.87%	0.63%	1.11%	$31,020	13.12%	8.24%	26.48%
Minnesota									
MP&M Only	16	92.56%	3.40%	0.90%	2.59%	$35,651	8.26%	4.53%	26.12%
Entire State	88	94.47%	2.17%	1.13%	1.75%	$30,909	10.22%	5.15%	26.69%
Mississippi									
MP&M Only	10	61.17%	38.23%	0.14%	0.35%	$24,559	21.21%	7.28%	28.83%
Entire State	82	63.46%	35.59%	0.34%	0.49%	$20,136	25.21%	8.43%	29.04%
Missouri									
MP&M Only	18	79.23%	18.78%	0.33%	1.10%	$28,883	12.04%	6.27%	25.21%
Entire State	115	87.68%	10.69%	0.44%	0.77%	$26,362	13.34%	6.16%	25.71%
Montana									
MP&M Only	1	97.70%	0.59%	0.54%	0.35%	$22,658	15.20%	6.53%	25.62%
Entire State	56	92.78%	0.26%	5.98%	0.53%	$22,988	16.07%	6.96%	27.88%
Nebraska									
MP&M Only	8	90.67%	6.67%	0.55%	1.20%	$29,801	9.70%	3.89%	26.79%
Entire State	93	93.83%	3.62%	0.80%	0.80%	$26,016	11.14%	3.66%	27.19%
New Hampshire									
MP&M Only	2	97.57%	0.77%	0.23%	0.97%	$39,194	5.77%	6.02%	25.52%
Entire State	10	98.02%	0.65%	0.22%	0.81%	$36,329	6.42%	6.22%	25.16%
New Jersey									
MP&M Only	12	77.33%	14.43%	0.19%	4.03%	$42,046	7.76%	5.96%	23.02%
Entire State	21	79.37%	13.39%	0.19%	3.49%	$40,927	7.58%	5.75%	23.27%
New Mexico									
MP&M Only	3	76.59%	2.51%	4.85%	1.35%	$27,220	15.16%	6.70%	27.14%
Entire State	33	75.81%	1.97%	8.85%	0.95%	$24,087	20.61%	8.02%	29.47%
New York									
MP&M Only	32	71.09%	17.98%	0.32%	4.31%	$34,563	13.55%	7.08%	23.44%
Entire State	63	74.47%	15.90%	0.33%	3.83%	$32,965	13.03%	6.88%	23.66%

Table 17.3: County Level Comparison of Demographic Data: Counties with Sample MP&M Facilities Versus Entire State

State	Counties	% White	% African-American	% Native American, Eskimo, or Aleut	% Asian or Pacific Islander	Median Income	% Below Poverty Level	% Un-employed	% Children
North Carolina									
MP&M Only	26	76.77%	21.67%	0.32%	0.95%	$29,802	10.66%	4.09%	23.62%
Entire State	100	75.60%	21.96%	1.25%	0.76%	$26,647	12.97%	4.79%	24.27%
North Dakota									
MP&M Only	1	97.34%	0.09%	2.15%	0.40%	$24,248	12.24%	5.72%	27.18%
Entire State	53	94.71%	0.55%	3.96%	0.50%	$23,213	14.38%	5.30%	27.50%
Ohio									
MP&M Only	43	85.69%	12.60%	0.20%	0.92%	$29,485	12.15%	6.40%	25.67%
Entire State	89	87.81%	10.62%	0.21%	0.82%	$28,706	12.54%	6.60%	25.85%
Oklahoma									
MP&M Only	5	82.64%	8.39%	7.14%	1.05%	$26,325	13.75%	5.87%	26.19%
Entire State	77	82.26%	7.38%	8.03%	1.04%	$23,577	16.71%	6.87%	26.60%
Oregon									
MP&M Only	9	92.01%	2.15%	1.13%	3.02%	$29,022	11.47%	5.62%	25.10%
Entire State	36	92.80%	1.60%	1.46%	2.38%	$27,250	12.42%	6.20%	25.49%
Pennsylvania									
MP&M Only	39	86.76%	10.72%	0.13%	1.29%	$30,240	11.05%	5.91%	23.40%
Entire State	68	88.57%	9.15%	0.13%	1.14%	$29,069	11.13%	5.97%	23.54%
Rhode Island									
MP&M Only	4	90.97%	4.13%	0.35%	1.82%	$31,791	9.95%	6.77%	22.48%
Entire State	5	91.59%	3.79%	0.43%	1.76%	$32,181	9.61%	6.64%	22.52%
South Carolina									
MP&M Only	15	74.91%	24.24%	0.20%	0.50%	$26,692	14.01%	5.36%	25.91%
Entire State	46	69.05%	29.83%	0.26%	0.61%	$26,256	15.37%	5.58%	26.44%
South Dakota									
MP&M Only	2	91.36%	1.19%	5.72%	1.15%	$24,539	13.96%	5.17%	27.67%
Entire State	66	91.55%	0.45%	7.24%	0.48%	$22,503	15.86%	4.16%	28.58%
Tennessee									
MP&M Only	21	75.45%	23.31%	0.25%	0.80%	$25,904	15.86%	6.28%	24.75%
Entire State	95	83.01%	15.93%	0.26%	0.63%	$24,807	15.70%	6.41%	24.93%
Texas									
MP&M Only	18	71.56%	13.80%	0.39%	2.55%	$29,534	16.93%	7.02%	28.23%
Entire State	254	75.28%	11.88%	0.41%	1.85%	$27,016	18.10%	7.11%	28.47%
Utah									
MP&M Only	4	93.12%	0.85%	0.87%	2.42%	$30,281	9.79%	4.98%	34.92%
Entire State	29	93.88%	0.64%	1.41%	1.92%	$29,470	11.36%	5.32%	36.45%
Vermont									
MP&M Only	1	98.69%	0.40%	0.30%	0.59%	$28,485	11.30%	7.53%	25.06%
Entire State	14	98.55%	0.39%	0.39%	0.54%	$29,792	9.86%	5.85%	25.51%
Virginia									
MP&M Only	29	75.03%	20.17%	0.30%	3.49%	$38,074	9.05%	4.26%	24.64%
Entire State	135	77.47%	18.80%	0.26%	2.57%	$33,328	10.25%	4.48%	24.31%
Washington									
MP&M Only	7	88.93%	3.29%	1.34%	5.58%	$34,174	8.79%	4.83%	24.87%
Entire State	40	88.64%	3.03%	1.71%	4.34%	$31,183	10.92%	5.72%	25.86%

Table 17.3: County Level Comparison of Demographic Data: Counties with Sample MP&M Facilities Versus Entire State

State	Counties	% White	% African-American	% Native American, Eskimo, or Aleut	% Asian or Pacific Islander	Median Income	% Below Poverty Level	% Un-employed	% Children
West Virginia									
MP&M Only	2	98.57%	1.10%	0.10%	0.21%	$20,613	19.06%	9.12%	25.48%
Entire State	55	96.24%	3.09%	0.17%	0.42%	$20,795	19.66%	9.58%	24.77%
Wisconsin									
MP&M Only	24	89.07%	8.00%	0.59%	1.16%	$30,056	11.10%	5.25%	26.02%
Entire State	73	92.28%	4.99%	0.81%	1.08%	$29,442	10.70%	5.20%	26.39%

Note: Alaska, Hawaii, Nevada, and Wyoming are not represented because no MP&M facilities from these states were surveyed.
Source: U.S. EPA analysis of 1990 Census of Population Data.

This comparison indicates that African-American households are expected to receive a relatively larger share of the benefits from the MP&M rule. The higher representation of these households among the benefiting population is to some extent likely to be explained by their relatively higher concentration in urban areas, where most MP&M facilities are situated and their effluents released.

17.2 Protection of Children from Environmental Health and Safety Risks

Lead is harmful to all exposed individuals, and its effects on children are of particular concern. Lead exposure is more likely to cause neurobehavioral deficits in children because their rapid rate of development makes them more susceptible to adverse effects. EPA expects that the proposed regulation will benefit children in many ways, including:

- Reducing health risk from exposure to MP&M pollutants from consumption of contaminated fish tissue and drinking water, and
- Improving recreational opportunities for children and their families.

In Chapter 14, EPA measured one category of benefits specific to children: avoided health damages to pre-school-age children from reduced exposure to lead. The analysis considered several measures of children's health benefits associated with lead exposure for children up to age six. Avoided neurological and cognitive damages included:

- Lower overall IQ levels,
- Increased incidence of low IQ scores (<70), and
- Increased incidence of blood-lead levels above 20 µg/dL.

The Agency also assessed changes in incidence of neonatal mortality from reduced lead exposure.

EPA expects the proposed rule to yield $14.4 million (1999$) in annual benefits to children from reduced neurological and cognitive damages and reduced incidence of neonatal mortality.

EPA also examined whether lead discharges from MP&M facilities are likely to have a disproportionate impact on children in subsistence anglers' families. Table 17.4 compares risk levels and benefits to children from subsistence fishing families and recreational fishing families. Children from subsistence fishing families have a much greater risk of adverse health effects from exposure to lead due to consumption of a high proportion of fish from local waters.

EPA's analysis shows that the lead reductions under the proposed MP&M rule are particularly beneficial for children from subsistence fishing families. The average estimated risk reduction per child for each of the four estimated lead-related health effects was much larger for children in subsistence fishing families than for those from recreational fishing families. This finding is also supported by the monetary estimates of benefits per child in each population category.

EPA estimated that the monetary value of benefits per child from a subsistence fishing family is $764, as compared to $74 per child from recreational fishing families. These benefits comprise a larger portion of subsistence fishing families' income compared to the benefits received by a recreational fishing family, because subsistence fishing families generally have lower household income.

EPA estimated that the monetary value of benefits from reduced cognitive damages to children in subsistence household is about 2.9 percent of their current household income, while benefits to recreational fishing families is 0.2 percent of their household income. This analysis uses average household income in low income/minority families and average household income of all households in the United States (1990 Census data).

Table 17.4 summarizes estimated changes in health risk and the monetary value of benefits to children from recreational and subsistence fishing families.

Table 17.4: Estimated Benefits to Pre-School Children from Reduced Exposure to Lead

Benefit Category	Population Category	Number of Exposed Children	Reduction in the Number of Adverse Health Effect Cases	Estimated Monetary Value of Avoided Health Damages to Children (1999$)	
				Total	Per Child
Neonatal Mortality	Recreation		0.92	$5,336,000	$47
	Subsistence		0.69	$4,002,000	$609
Avoided IQ Loss (Points)	Recreation		390.43	$3,934,410	$30
	Subsistence		98.65	$994,104	$151
Occurrence of IQ < 70	Recreation		1.39	$101,311	$1
	Subsistence		0.35	$25,079	$4
Occurrence of PbB > 20 µg/dL	Recreation		0.03	$686	negligible
	Subsistence		0.06	$60	negligible
Total	**Recreation**	**131,511**		**$9,372,407**	**$74**
	Subsistence	**6,576**		**$5,021,243**	**$764**
	All Children	**138,087**		**$14,393,650**	**$104**

Source: U.S. EPA analysis

GLOSSARY

hazard ratio: a ratio of the estimated ingestion rate of a pollutant to the reference dose (RfD) value for the pollutant. The RfD is an estimate of the maximum daily ingestion rate in mg/kg per day that is likely to be without an appreciable risk of deleterious effects during a lifetime. A hazard ratio greater than one indicates that individuals would be expected to ingest MP&M pollutants at rates sufficient to pose a significant risk of systemic health effects.

MP&M reach: a reach to which an MP&M facility discharges.

REFERENCE

1990 Census data: http://www.census.gov/